

Cricket

# Ask

Science and Exploration for Curious Kids



Brilliant  
Blood



J. HARTER



# Ask<sup>®</sup>

Science and Exploration for Curious Kids

Volume 23, Number 8

October 2024

Amy Tao  
Tracy Vonder Brink  
Hayley Kim  
Anna Lender  
Pat Murray  
Julie Alissi  
Laura Woodside  
Barb Clendenen

Editor  
Contributing Editor  
Assistant Editor  
Art Director  
Designer  
Permissions Specialist  
SVP Education Products  
Director of Circulation

ASK magazine (ISSN 1535-4105) is published 9 times a year, monthly except for combined May/June, July/August, and November/December issues, by Cricket Media, Inc., 1751 Pinnacle Drive, Suite 600, McLean, VA 22102. Periodicals postage paid at McLean, VA, and at additional mailing offices. For address changes, back issues, subscriptions, customer service, or to renew, please visit [shop.cricketmedia.com](http://shop.cricketmedia.com), email [cricketmedia@cdsfulfillment.com](mailto:cricketmedia@cdsfulfillment.com), write to ASK, P.O. Box 6395, Harlan, IA 51593-1895, or call 1-800-821-0115. POSTMASTER: Please send address changes to ASK, P.O. Box 6395, Harlan, IA 51593-1895.

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1st Printing Quad Sussex, Wisconsin September 2024

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Suggested for ages 7 to 10.



Why is icefish blood white?

page 17

## Departments

2 Nosy News

4 Nestor's Dock

29 Ask Jimmy and The Bug

30 Contest and Letters

33 Whatson's Book Corner

back cover: Marvin and Friends

Need blood?

page 22







page 6

What's making that red glow?

## Features

**6** Life's Blood  
by Margaret J. Anderson

**12** Strange Blood  
by Christy Peterson

**16** Icefish Diaries  
by Paula Dell

**22** Buckets of Blood

**24** Lunching with Leeches  
by Lela Stanley

page 15



When is a horseshoe crab a lifesaver?

page 25



Is this a real-life vampire?







by Tracy  
Vonder  
Brink

## CALLING DR. RAKUS



Researchers at the Gunung Leuser National Park in Sumatra noticed Rakus, one of the orangutans that lives in the protected rainforest, was injured. He had a wound on his cheek, possibly from a fight with another male. Then Rakus surprised the scientists by picking leaves from a plant known to help with healing. He chewed them, put their juice on the cut, and covered it all with more leaves. He also ate some of the leaves.

The next day, he did it again, and he also rested more than usual. Five days later, the cut had closed. A month later, it was completely healed.

Researchers have been studying orangutans in the national park for 21 years and have never seen one treat itself with medicine before. They wonder if Rakus used the leaves by accident, then did it again because his cut felt better, or if he knew it would help.

Orangutans are known to share skills with one another, so it's possible Rakus might share how to treat wounds with others in his group. Researchers will be watching to see if he does.



Poor thing!

Don't worry—he's all better now!



## No Magic Cloak Needed

Leafhoppers are insects that match their names—they quickly jump from leaf to leaf to find sap to suck. These common backyard bugs can be pests that harm plants,

but one group of scientists think leafhoppers could inspire new technology to help protect our skin. Or even create a sort of invisibility cloak.

Leafhoppers make tiny particles shaped a bit like soccer balls. They coat their bodies with them, but scientists don't understand why. To try and find out, a team at Pennsylvania State University used a high-tech 3D printer



# STUDENTS CRACK AN ANCIENT MYSTERY

When the volcano known as Mount Vesuvius erupted in 79 CE, it buried the Roman city of Herculaneum in layers of ash 82 feet (25 m) deep. One of the buried homes held a library with more than 1,000 scrolls, rolls of paper used as books in ancient times. The scrolls were discovered in the 18th century, but they were too fragile to unroll and read—the ash's heat had turned them into charred lumps.

More books to read!



In 2023, a contest called the Vesuvius Challenge released scans of some of the scrolls and offered prizes to anyone who could figure out how to read them. To win, a team of three college computer science students developed an artificial intelligence system to detect tiny spots of ink on a scroll and then put them together to form letters. Experts were able to read parts of one scroll for the first time in 2,000 years.

The students won a \$700,000 prize for their work. More importantly, they may have unlocked the key to reading the rest of the scrolls.



© Vesuvius Challenge

Nothing to see here!

to create shapes like the ones leafhoppers make, but much bigger. The scientists found that the shapes scatter visible light and absorb UV, or ultraviolet, light. They think the leafhoppers may cover themselves with the particles to hide from birds and other predators that use UV light to find them.



Now the team is working on making a coating the way leafhoppers do. The scientists says if it works, a coating that absorbs UV light could make a better sunscreen to protect our skin. Or, if they can make it scatter and absorb enough light, it might make things seem invisible to our eyes.



# NESTOR'S DOCK

by Jeffrey Ebbeler

My special fake blood recipe is almost ready.



Then I can smear it on my mummy costume. It's gonna look so scary.



Bang!  
Bang!



Oh, hi, Nestor. Do you want some fake blood for that head wound?



It's not quite thick enough.

Add some pieces of Jello to make it chunky.

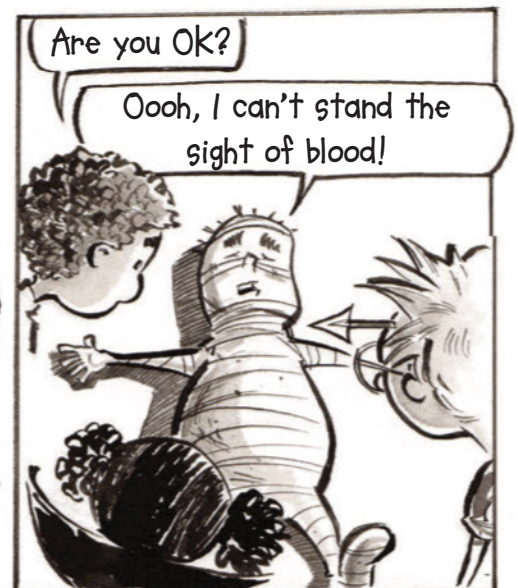
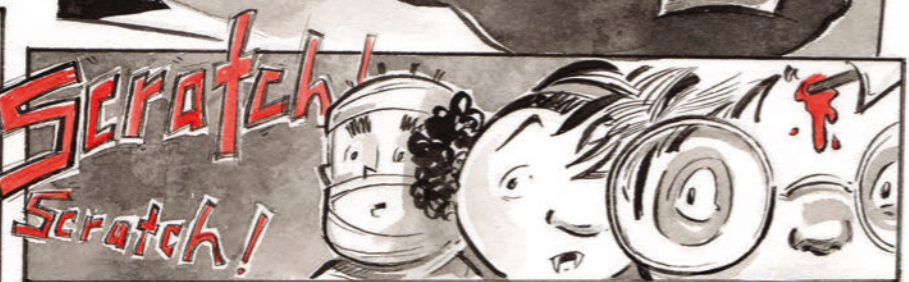
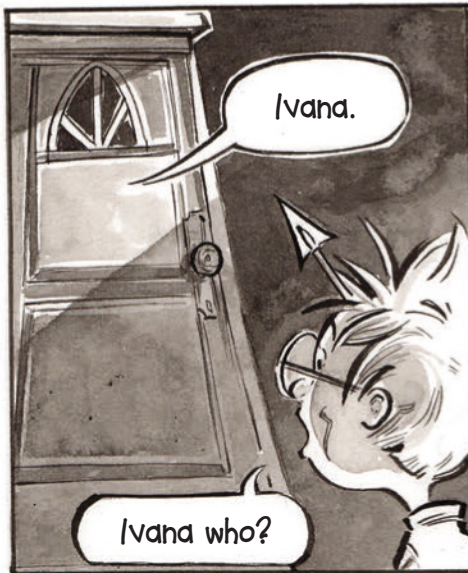


Knock!  
Knock!

Who's there?









by Margaret  
J. Anderson,  
art by Ariane  
Elsammak

Shine a  
flashlight in  
your mouth.  
That red  
glow in your  
cheek is your  
blood, the  
liquid of life.



**T**ry  
this:  
press two  
fingers gently against the  
side of your neck, below your chin.  
Feel the little thump-thump?  
That's your heart pumping blood  
through your  
veins.

Your blood is  
always on the move.  
Once every minute it  
travels all the way around your body  
and back again to your heart.  
Your heart pumps all that blood  
around. Today, every school kid  
knows that. But for thousands  
of years, even the greatest  
doctors in the world  
didn't know why the  
heart beat or what  
flowed through  
the body's many  
tubes. (Some  
thought veins also  
carried air or even  
your spirit.) What  
goes on inside the  
human body was just as  
mysterious as the stars.



What's so special about the red stuff?



## Gladiator School

That's really not too surprising, once you stop to think about it. After all, you can't see through your skin. You can feel some of the things that are going on inside you—you can feel your heart beating, or your chest filling with air. You can listen to the weird gurgling in your stomach. You can see that food and water go in one end of you and come out the other. But what goes on in-between? With no way to look inside, doctors could only guess.

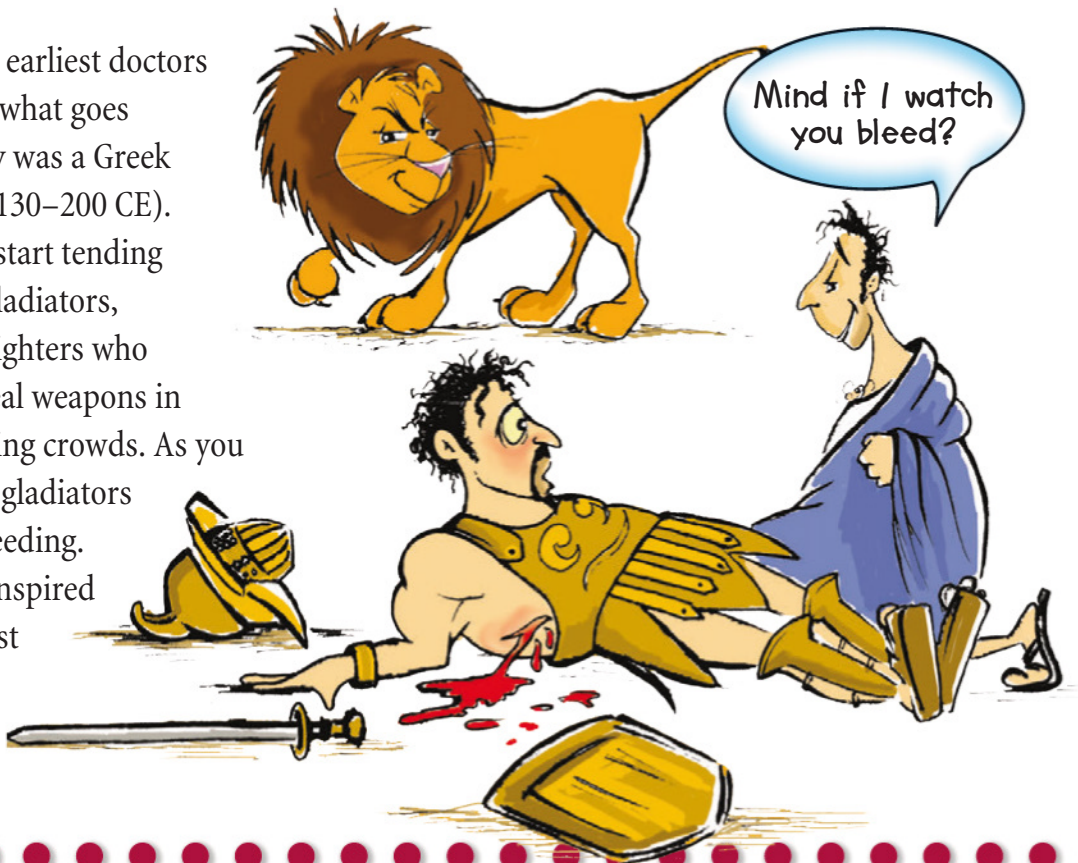
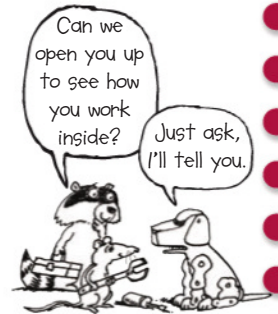
Of course, even in ancient times, when people butchered animals for food or got injured in battles, they could see organs and blood. But it wasn't always easy to figure out how all that messy stuff works inside a living person.

One of the earliest doctors to investigate what goes on in the body was a Greek called Galen (130–200 CE). Galen got his start tending to wounded gladiators, professional fighters who fought with real weapons in front of cheering crowds. As you might expect, gladiators did a lot of bleeding. Perhaps this inspired Galen's interest in blood. It certainly

gave him a good way to study the insides of bodies. Galen also carefully cut open dead animals to discover how they work. The books Galen wrote were used by doctors for hundreds of years.

Unfortunately, many of Galen's ideas were totally wrong.

For instance, Galen didn't know that the heart beats because it is pumping blood. He thought that blood vessels pulsed on their own, pulling blood into the heart. He also had no idea that the same blood circulates over and over again through the body. He thought that blood got used up as soon as it left the heart and that the liver constantly made new blood from the food we eat.





You can re-create one of Harvey's experiments.

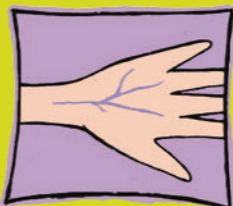
1. Find an unbranched vein on the back of your hand or on your forearm. Firmly place two fingers on it.



2. With the finger closest to your heart, stroke the vein in the direction of blood flow—toward the heart. This empties the vein of blood.



3. Keep pressing on the vein with the other finger. The vein should not refill. Blood in the veins can only flow toward the heart.



4. Now lift your finger and watch the vein fill.

According to Galen, inside the heart, dark blood made from digested food in the liver was warmed, and a life-giving substance called “vital spirit” was added to it. Galen believed that the lungs made this



This can't be right!



vital spirit out of air, and that it turned the blood bright red. Well, he was right that blood gets something from the air.

## The Circle of Blood

Galen's views were unquestioned for almost 1,500 years. In fact, doctors who doubted Galen were sometimes burned at the stake. It wasn't until the 1600s that an English doctor named William Harvey figured out that the heart pumps blood around the body.

Simple math told Harvey that Galen couldn't be right that each heartbeat pumped all-new blood. Harvey measured the blood pumped out by each beat of the heart: about two ounces (57 g). That means that a heart beating 72 times a minute pushes out nine pounds (4.1 kg) of blood. For Galen to be right, a person's liver would need to be making 540 pounds (245 kg) of blood every hour from the food a person ate. It couldn't be done! The answer had to be that the same blood is pumped over and over again. As Harvey put it: “I began to think there was some sort of motion as in a circle.”

By doing simple experiments that involved pinching off arteries and veins, Harvey was able to map the blood flow through the heart and around the body. The right side of the heart pumps blood to the lungs; the blood then returns to the left side of the heart, where it is pumped to the rest of the body.



## What Is Blood?

Harvey didn't get everything right.

He didn't know exactly why blood circulates. He thought, for instance, that blood traveled to the lungs to be cooled. Today we know that blood picks up oxygen in the lungs (and gets rid of carbon dioxide).

And it does much more. Blood carries food, minerals, germ fighters, and chemical messages all over the body. It also collects waste chemicals from cells. The liver and kidneys filter out the wastes and send them to be expelled in pee and poop.

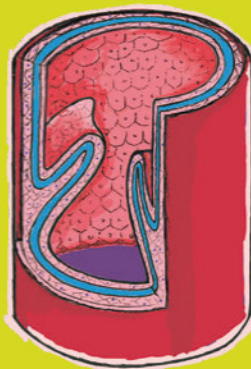
Blood is made up of several different kinds of cells floating in a yellowish liquid called plasma. A 100-pound (45-kg) person has about 7 pounds (3 kg) of blood in his or her body. Every drop contains millions of cells.

### Little Doors in the Veins

Harvey's first clue that blood circulates around and around was the discovery of tiny flaps like little doors in the veins. Harvey noticed that the doors, called

valves, open in one direction only.

Because of these valves, the blood in each vein can flow only one way—around the body in a big loop.



BODY WORLDS is a traveling exhibit that shows what bodies look like under the skin. If only Galen could have seen it.

Blood vessels seem to be everywhere in this arm. But there are even more that you can't see—tiny blood vessels called capillaries.

All these tubes carry blood to every part of your body, even inside bones. The blood brings oxygen and nutrients that keep your body working.



photo © Gunther von Hagens' BODY WORLDS, Institute for Plastination, Heidelberg, Germany, [www.bodyworlds.com](http://www.bodyworlds.com)

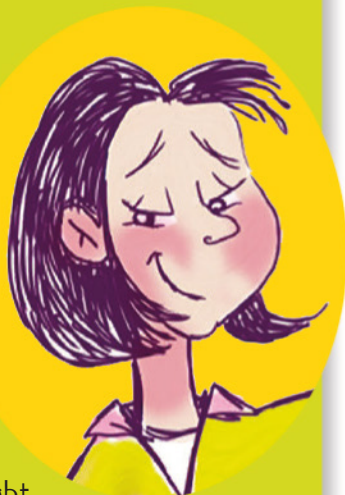


## Is My Face Red!

Eager to get that last bit of ice cream soda, you slurp hard... SRRRWRT. Everyone in the restaurant turns around to stare. Oops! If you're like many people, your face has just gone bright red. Why?

Blushing is an automatic response that happens when you're embarrassed. When you make a social goof (or think you might have), two small glands, one on top of each kidney, make adrenaline, a fear chemical that wakes you up. Adrenaline also widens blood vessels in your face, letting in more blood—and giving your cheeks that unmistakable hot pink flush.

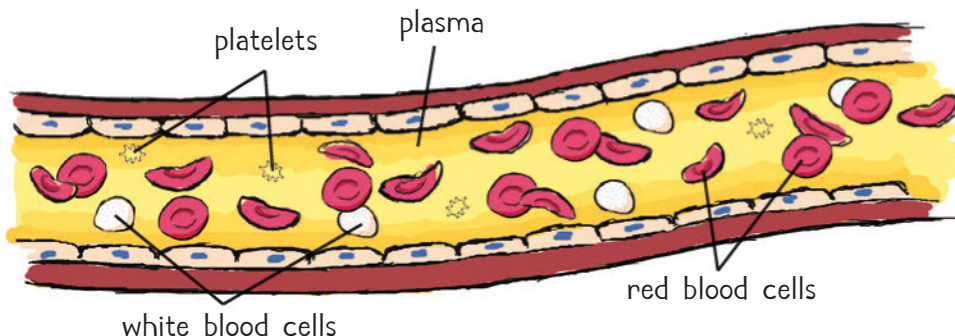
Humans are the only animals that blush. Scientists still aren't entirely sure why we do it. But it might have evolved as a way to signal to others that we know we've made a misstep—an automatic "Sorry!" that can't be faked.



It's a good thing I don't blush!



Why are red blood cells such a funny shape? Their flattened donut shape folds easily, so they can slip through tiny blood vessels just a single cell wide. Perfectly round cells would get stuck.



Each blood cell has a job to do. Red blood cells carry oxygen from the lungs to the rest of the body. White blood cells are the defense team. They fight bacteria and viruses that cause disease. Platelets are the repair crew. They float around in the blood but get spiky and stick together if a blood vessel is damaged. This makes a clot, a little plug to stop the bleeding.

Red blood cells are filled with hemoglobin, a special oxygen-trapping molecule. The hemoglobin snags oxygen at the lungs and lets go of it at cells. Hemoglobin is red, and it gives blood its red color.

Each red blood cell lasts about four months. In that time it will make about 75,000 trips around your body. When blood cells wear out, marrow inside your bones makes new blood cells to replace them.

Every second of every day, your heart beats. Thump thump! Although only the size of your fist, your heart is the most powerful muscle in your body. That's because it has the most important job—to keep the blood flowing, around and around. 🚀



## The Body's Delivery System

The first job of blood is to pick up oxygen from the lungs and carry it to every cell in the body. Your cells need oxygen to release stored energy.

### Pump

Your heart is your strongest muscle, working day in, day out to pump blood around.

### Chemical Factory

The liver filters the blood and checks to make sure the blood has the right chemical balance. If the mix isn't quite right, the liver tries to fix it.

### Air Filter

Once the oxygen has been dropped off, blood picks up carbon dioxide from cells and carries it to the lungs to be breathed out.

### Messenger Service

Blood carries a constant stream of chemical messages between the brain and different body parts, to help all the organs work together.

### Blood Highway

Arteries flow away from the heart. They carry bright red blood filled with oxygen.

Veins flow toward the heart. They carry blood back to the lungs to dump carbon dioxide and pick up more oxygen.

Is all that really inside me?

### Garbage Remover

Your two kidneys remove wastes and mix them with extra water to make pee.

Your bladder stores the liquid waste until you can get rid of it.

### Heater

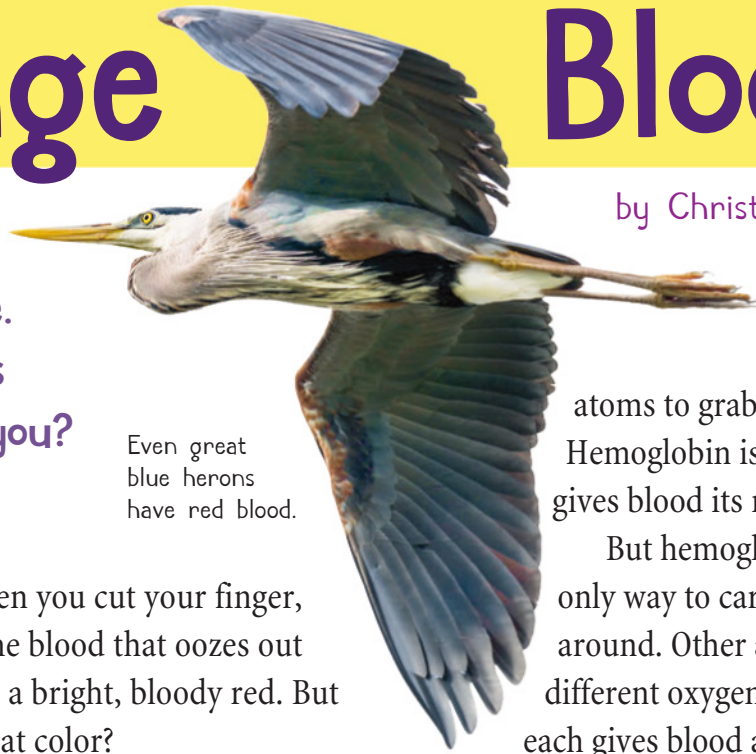
Blood also moves heat around to keep your whole body the same temperature.



# Strange Blood

by Christy Peterson

Bird's blood is red,  
Crab's blood is blue.  
What color blood is  
the right one for you?



Even great blue herons have red blood.



**W**hen you cut your finger, the blood that oozes out is a bright, bloody red. But why is it that color?

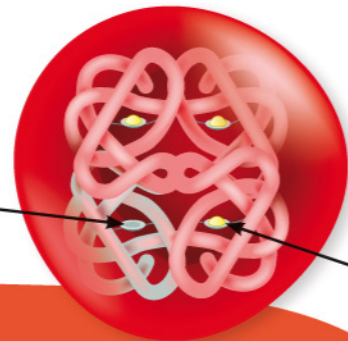
One of blood's most important jobs is to deliver oxygen all around the body. The oxygen is carried by tangly molecules inside blood cells. These molecules include bits of metal that grab onto oxygen.

In red-blooded animals, the oxygen carrier is called hemoglobin. It uses iron

atoms to grab oxygen. Hemoglobin is red and gives blood its red color.

But hemoglobin isn't the only way to carry oxygen around. Other animals have different oxygen traps. And each gives blood a different color. There's a whole rainbow!

Hemoglobin is a big, tangly molecule with four bits of iron inside. Oxygen likes iron and jumps in. When the blood cell passes a body cell that needs oxygen, the oxygen jumps out and carbon dioxide jumps in instead.



Rabbit

## Red

Most vertebrates (animals with backbones) have red blood that uses iron to carry oxygen around. When hemoglobin is full of oxygen, it is bright red. After the oxygen is delivered, it looks darker.

**Oxygen carrier: Hemoglobin**



Tree frog





I like to color-coordinate.

## Blue

Octopuses, squids, crabs, snails, and scorpions have blue blood, not red. Their oxygen carrier uses copper instead of iron. And when copper grabs oxygen, it looks blue-green.

**Oxygen carrier:**  
**Hemocyanin**



Cuttlefish

Peanut worms



## Violet

Some ocean worms and shellfish have violet blood. Their oxygen-collecting team uses two iron atoms instead of one. It looks purple when it's full of oxygen.

**Oxygen carrier:**  
**Hemerythrin**

Lingula



Scorpion



Snail



## Green

Christmas-tree sea worms have green blood. It also uses iron, like hemoglobin, but in differently shaped molecules that look green.

**Oxygen carrier:**  
**Chlorocruoin**



Christmas-tree worm



Spurred tortoise

## Colorless

And of course, there are exceptions to every rule. Beneath the Antarctic ice live a strange group of icefishes that don't have any kind of oxygen-carrying molecule. So their blood is pale, like milky water. In these fish, oxygen is carried by a different part of the blood, the plasma.

Icefish





# Super Blood!

Blood does a lot of amazing things. It carries food and oxygen to cells, clears away waste, carries messages, and moves heat around. Some animals have blood that can do even more. Their blood has super powers!



Wood frog



## Antifreeze Blood

Wood frogs are small, but they use an amazing trick to survive the winter—they freeze solid, then thaw out in spring.

For most animals, freezing is dangerous. That's because when water in the body freezes, it expands and forms sharp crystals, crushing the body's cells.

But when it gets cold, this frog fills up its cells with a thick, sugary syrup that stiffens them so they don't get crushed. Special proteins in the frog's blood cause smooth shells of water to freeze around cells like armor. This protects the cells instead of breaking them. So the frog sits, frozen, until spring, when it thaws and hops away, good as new.

Many fish that live in icy oceans have similar tricks to keep their blood from freezing solid.

Cuvier's beaked whale



## Blood for Deep Dives

Cuvier's beaked whales can dive deeper and longer than any other mammal. They can hold their breath for over two hours! What's their secret? Like other diving mammals, they have more blood than land animals of the same size. And that blood is packed with a lot of extra red blood cells. This means they can store much more oxygen, so they can go a long time between breaths. This souped-up blood gives ocean air-breathers super diving powers.



## Poison Blood

The blood of *Prasinohaema* skinks isn't red like that of other lizards. It's green! And not just the skink's blood—its muscles, its bones, even its tongue is green. This is because it's full of a greenish chemical called biliverdin, a waste product that the liver usually gets rid of. Too much biliverdin is poisonous. So how do the skinks survive? And why do they have so much biliverdin in their blood anyway? No one knows for sure. Some scientists think that these lizards may use the toxins in their bodies to fight off the same nasty parasite that causes malaria in people.



Plush, you're cut!



I'm a stuffed animal!  
I bleed foam bits.

## Blood to the Rescue!

This strange-looking creature may have saved your life, and you didn't even know it! That's because the blue blood of horseshoe crabs is a super germ detector. It thickens and forms a clot around even tiny amounts of bacteria, viruses, or fungi. In the wild, this helps the crabs avoid infections. And it also helps us. Medicine factories use drops of horseshoe crab blood to check that each batch of medicine is safe before it goes to stores. The super blood of these crabs protects people all over the world!



The blue blood of horseshoe crabs is collected from live animals that are then returned to the sea. Scientists are working hard to find a way to make artificial crab blood, so they can avoid disturbing the crabs.



Horseshoe crab

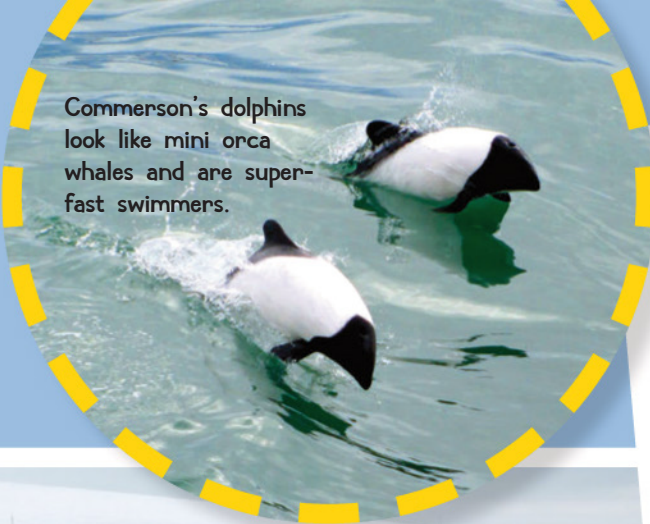
Do horses really wear shoes that spiny?



I hope not.







Commerson's dolphins look like mini orca whales and are super-fast swimmers.

## April 13

We set sail this morning and are headed to the Antarctic. It was a beautiful day as we traveled through the Magellan Straits. Lots of birds followed us for a bit, and some Commerson's dolphins zipped alongside the boat.

## April 17

We arrived at Palmer Station today and got to work unpacking supplies. Palmer Station can house about 46 people. It's very cozy. Along with the icefish team, there are scientists here studying birds, ocean worms, Earth's magnetic field, ocean microbes, and more. Everyone's projects are so interesting, I want to check them all out! Tomorrow we head out for our first fishing expedition.



Here's Palmer Station, with a few of the locals.

## April 20



Today we set fish traps. We put a little bait in each. The fish can swim in, but they can't get out. Then we collect the traps and put the fish

into our aquarium. This time we caught mostly red-blooded fishes.

To stay warm, we dress in lots of layers. I put on long underwear, fleece pants, fleece jacket, fishing pants, knee-high waterproof boots, wool gloves, waterproof gloves, fleece hat, hard hat—ready to go! With my float coat on top, I looked like an overstuffed orange penguin. But hey, I was cozy and warm!

This is a trap for fish, called a fish pot. The black bag has bait inside. The bait lures the fish in, but sadly no meals are served once inside.



Lisa, one of the fish scientists, shows off our stylish safety coats. A long flap hangs behind and attaches in front. It's called a beaver tail. This keeps the coat from coming off if you fall in the water, but it does look a bit like a diaper really.



# Icefish Diaries

Like the ice they live under, the blood of some Antarctic fishes is white, not red. Why? One brave science teacher went to find out.

by Paula Dell



**April 23**

We had a good fishing trip and got some white-blooded icefish. We also got a lot of bristly ocean worms for one of the other science teams. And an octopus! They really do live everywhere.



A white-blooded icefish



Paula Dell taught science at Lindblom Math & Science Academy in Chicago. She went to Antarctica in 2011 as part of the PolarTREC program, which pairs teachers with research teams.



**April 25**

So what's so special about the icefish? Many things! They have adapted to life in extreme cold. They do not have scales or swim bladders (which fish use to go up and down in the water). They prefer to hang out near the ocean floor. And their blood is full of special proteins that keep their cells from freezing.

The white-blooded icefish have another strange feature. They have no hemoglobin, the red stuff that carries oxygen through the body.

Because they don't have hemoglobin, their blood isn't red, but almost clear, like frosted glass. Pale blood means their gills are white too, not red. And their hearts are much larger than red-blooded fish of the same size.

So without hemoglobin, how do these fish get oxygen to their cells, you ask? It's carried around by the plasma, the clear part of the blood. These fish may also absorb oxygen directly through their skin. It helps that the cold Antarctic water holds a lot more oxygen than warmer oceans.

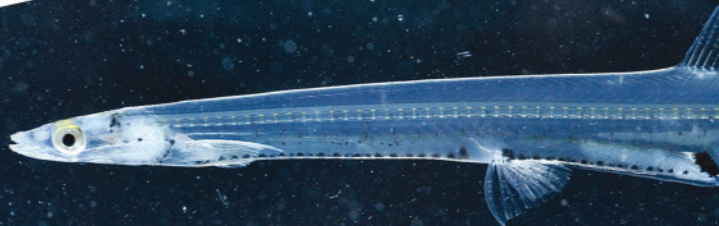
A fish without hemoglobin is quite strange, so of course it's very interesting to scientists.

**April 29**

Now to give our fish some tests! Scientists already know that icefishes don't like warmer water. At higher temperatures, fishes' bodies use more oxygen and have a harder time storing it. So would more oxygen in the water help them stand the heat?

We'll test both white-blooded fishes and red-blooded fishes. We'll put some of each into two tanks. Both tanks will be slowly warmed, but one tank will have extra oxygen pumped in. Then we'll see whether the fish that get extra oxygen can stand higher temperatures before they have trouble staying upright.

Young icefish are nearly transparent.



How courteous. This gentoo penguin decided to wave when she saw I was taking her picture!



Dr. Kristin O'Brien takes a blood sample from a fish. Blood can tell you a lot about what goes on inside an animal.





## Blood. It tells a story.

Your blood travels around to every cell in your body. Everything that comes into or goes out of your cells is carried in your blood. So blood can tell doctors a lot about what's going on inside you. That is also why scientists collect blood samples from the animals they study. A single drop of blood can show whether an animal is healthy, what it eats, how old it is, who it's related to, whether it's pregnant, and what diseases it's had.

So how did the white-blooded fishes get white blood? Scientists think that long ago, a mutation (a small change in the DNA, sort of like a wrong letter in a word) knocked out some icefish's ability to make hemoglobin, a red molecule that traps oxygen. But the cold water of Antarctica holds so much oxygen that the fish could survive without it. Eventually they became their own new species. It's also possible that not having hemoglobin helps the fish in some way we haven't figured out yet.

So is it "fish" or "fishes"?

Many fish, but many kinds of fishes.



### May 1

Today I helped weigh southern giant petrel chicks. These big birds eat seafood, carrion, and even other birds. They are high on the food chain down here.

To get to the petrel chicks, we had to step through a field of seals. It was really cool. At first you don't really notice them. Then you start to realize that all those "rocks" are seals and that you're greatly outnumbered.

It looks like it should be simple. You find the petrel chick, pick it up, put it in a bag, and weigh it. Easy, right? Well...they aren't so keen to be picked up and put in a bag. Would you like that? So they squawk and snap their large, sharp bills. Bite-proof gloves are required!

I wrote down the numbers as Christina and Jeff weighed the chicks. I couldn't trust the petrel chicks to tell me their accurate weight, no matter how nicely I asked.





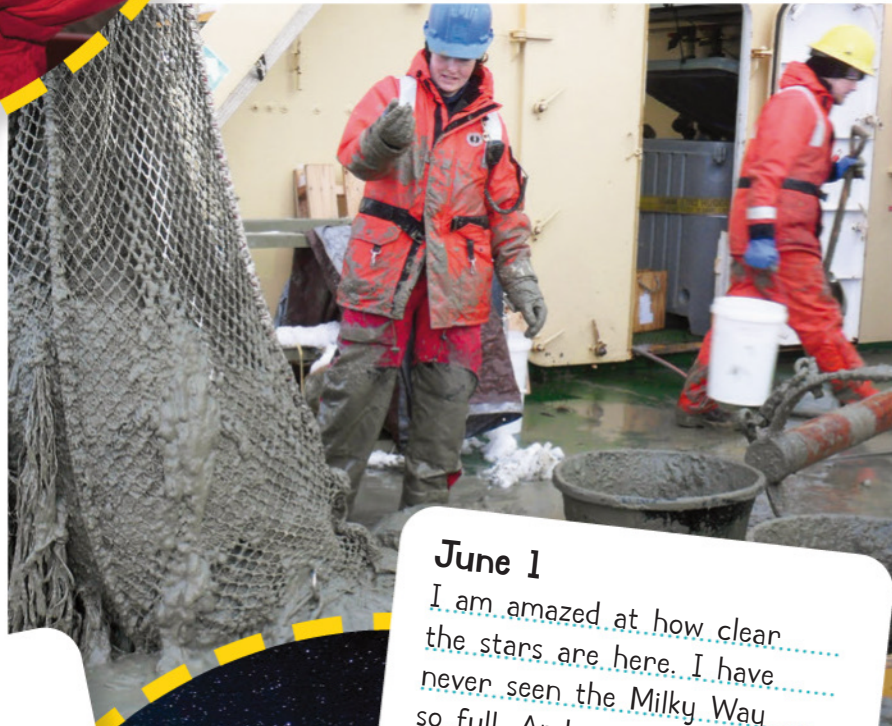
### May 3

Yesterday I had a video call with some of my students. This was the best way I could think of to get them to visit me in Antarctica. It was great to see their wonderful, familiar faces.

Today we pulled up mud from the ocean floor, looking for worms and other bottom-dwelling creatures. Depending on who you are, all this mud might seem like a lot of fun or your worst nightmare. I didn't mind it a bit!



Seaweed scientist Ruth slides down an iceberg.



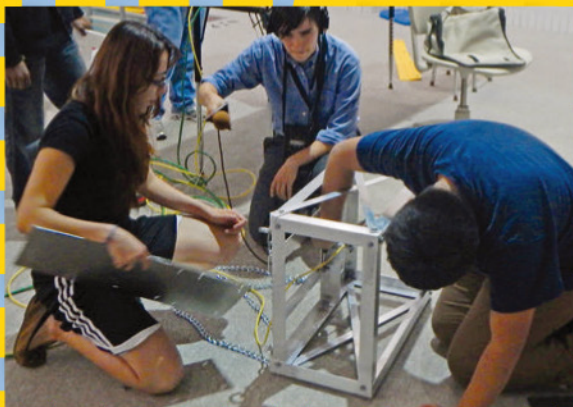
### June 1

I am amazed at how clear the stars are here. I have never seen the Milky Way so full. And since this is the Southern Hemisphere, the sky also looks upside down—Orion looks like he is standing on his head, and the phases of the moon are reversed.

### May 21

Today we took a little break to go swimming. While that might sound death-defying, it is very refreshing. Cold and salty! It makes you appreciate being warm-blooded. Actually, most fish make their own body heat too (like us, but unlike reptiles). But fish lose their heat to the water as fast as they make it, so they stay about the same temperature as the water around them.





My students are working on a camera box to spy on the fish.

## The Fish Spy

Inspired by my Antarctic adventure, some of my students built a waterproof camera float that can be towed behind a boat to take pictures of the seafloor where the icefish live. They made a sturdy metal frame to protect the camera. It had to be light, but strong enough to withstand the pressure and cold, salty water.

On my next trip I'll take it along and give it a try!



### June 4

So what have we learned? Our swim tests showed that extra oxygen in the water didn't really help either the red-blooded or the white-blooded fishes to withstand warmer temperatures. They just don't like heat. This was a bit surprising!

It makes me wonder, what will happen to the icefish as the oceans warm? And what can we do to help?

### June 8

Too soon, it's time to leave! There is so much beauty down here, it never gets dull.



Back home to balmy Chicago!

Now Chicago is on the map in Antarctica! Oops! I used a lower-case "m." Hope no one thinks Chicago is only 7,486 meters (4.65 miles) away.





# Buckets of Blood

art by Rupert van Wyk

Vampires on the loose?  
Dramatic death scene approaching?





**Y**ou're going to need some blood. Preferably, blood as fake as your vampire's removable fangs.

Real blood is no good. It starts to clump and thicken the minute it meets air. Plus it smells, attracts flies, and is hard to clean up. And, eeewww!

So what's a poor actor to do?

In the early days of movies, before color film was invented, the favorite fake blood was chocolate syrup! Filmed in black and white, it looks just like blood.

Modern movie magicians buy their fake blood by the gallon from special effects companies. There's blood specially made for spattering, or sword fights, or a fake bloody nose. It even comes in green.

But for home theatricals, it's easy to make your own splendid gore. Here's one favorite recipe you can try.

Now, how do you get that fake blood flowing when you need it?

When a scene calls for some bloodshed, actors first tape small bags of fake blood



Blood or chocolate?  
In black and white, it's  
hard to tell.



under their costumes.

Then when it's time to swordfight, the actor breaks the bag by squeezing it or pulling a string. Arrgh, got me!

The blood bag is one of the oldest tricks in theater, helping actors "bleed" since the plays of ancient Rome.

Hey! Who  
used all the  
ketchup?



## Bogus Blood

### Mix in a bowl:

- 1 tablespoon hot water
- 2 teaspoons corn starch
- 1 small packet dry fruit punch drink mix

### Add:

- 1/4 cup corn syrup
- 2 teaspoons chocolate syrup
- 1 teaspoon red food coloring
- 1 drop blue food coloring

Mix well. If needed, add drops of red or blue food coloring (one drop at a time!) until the blood is just the right shade.

To make thicker blood, add sugar or jelly. To make it thinner, add water. If you're going to be using your fake blood on clothes but not near your mouth, add a few drops of dish soap to help it wash out.



# LUNCHING WITH



What does a nice swim in a creek have in common with ear surgery and tracking rare animals through the jungle? The answer is a real-life vampire.

**I**t's a warm summer day, perfect for a dip in the pond. But when you come out of the water, you notice a small, worm-like creature stuck to your foot. As you watch, it swells in size—filling up with your blood. Congratulations! You've just met a leech. Don't worry, it won't drink much.

## Meet the Blood Eaters

The leech in your pond, like mosquitoes and vampire bats, is a hematophage, which means “blood eater.” Eating blood might seem unusual to us—and maybe a bit icky—but for some insects and animals, it's a clever way to get a good meal full of protein without the trouble of hunting.

PRETEND  
BLOODSUCKER



REAL  
BLOODSUCKER





# LEECHES

by Lela Stanley,  
art by Amanda Shepherd



Blood eaters prefer to be sneaky, not scary. Some, like vampire bats, hunt at night when their prey is asleep. They nip gently, so their victims don't feel the bite. And they just take a little blood. Chances are, the animal will never miss it.

Leeches are annelids, cousins of earthworms. There are hundreds of different kinds of leeches. They live all over the world—mostly in fresh water or damp woods, though a few live in the ocean.

Not all leeches drink blood. Some eat insects or dead things. But for many leeches, blood hits the spot.

A blood-sucking leech has three jaws and hundreds of tiny, very sharp teeth. A typical pond leech usually feeds for about 20 minutes. The blood from this meal will last it several months. Leeches have to be good at storing up food, because they can't be sure when the next meal might wander along. At each meal, they suck up to 10 times their body weight of blood. That's a lot for a little critter, but not much for the host animal.







Leeches were used to treat everything from stomachaches to baldness—though they often did patients more harm than good. So many leeches were sold to doctors that they became rare in some

places! Luckily for the leeches, as doctors learned more about how the body really works, they found better cures.

But recently, leeches have been making a surprising comeback as medical helpers. When doctors need to fix body parts full of very tiny blood vessels, like eyelids and ears, sometimes the area will swell dangerously with blood. Placing a

## Calling Dr. Leech

To dislodge a leech, gently move your fingernail around its mouth to break its suction grip. When it drops off, you may bleed a bit where it was attached. Leeches have special stuff in their spit called hirudin. This thins the blood and stops it from clotting, so the leech can keep drinking. Even after the leech lets go and drops off, its host may bleed for quite a while.

In ancient times, leeches' thirst for blood made them a favorite with—doctors! Before germs were discovered, many people believed that diseases were caused by the fluids in the body getting out of balance. One cure was to drain away “bad blood”—with leeches. In fact, the name “leech” comes from the old English word *laece*, which means “doctor.”



Luckily I have a patented leech remover!





leech or two on the spot keeps the blood flowing and drains off the extra blood, helping the area to heal. Leeches have saved many injured fingers, toes, and noses this way.

These modern medicinal leeches don't come from ponds. They're grown in tanks on special leech farms.

### The Kindly Ones

Vampire bats are native to South and Central America. They find large sleeping animals at night by heat and smell. Then they make a small cut with their sharp front teeth and lap up some blood. Like that of leeches, the saliva of vampire bats stops blood from clotting. Their bites are so small and their teeth so sharp that usually the victims don't feel a thing. Back at the bat cave, vampire bats are good neighbors—they often share their blood meal with less-lucky siblings and cousins who didn't manage to find a drink.



### Leech Detectives

Leeches are also helping scientists in another surprising way—to track rare and endangered animals. How can a little leech do that? By snacking.

In dense tropical rainforests, rare animals can be hard to spot. Leeches, on the other hand, are easy to find. In fact, scientists walking through the jungle often end up covered with them. And these leeches have likely fed on other animals as well. Aha!

When a leech eats an animal's blood, traces of DNA from that animal can still be found inside the leech even months later.







The DNA bits tell scientists what kinds of animals the leech has fed on—a snapshot of the forest. A sample of just 26 leeches from a forest in Vietnam revealed traces of many rare animals, including two species scientists had never seen in the wild.

Leeches live all over the world, so they could be used to track endangered animals in many places. And all they ask in return is a little sip. 



### Other Bloodsuckers

Here are just a few of the roughly 30,000 species of animals that feed on blood. Thirty thousand may sound like a lot, but it's just a fraction of the total number of animal species on Earth. That number ranges from 5 million to more than 700 million, depending on whom you ask. Luckily, most bloodsuckers are small. Imagine if an animal as big as an elephant or even a cat needed to fill up on blood!



Mosquito



River lamprey



Bed bug



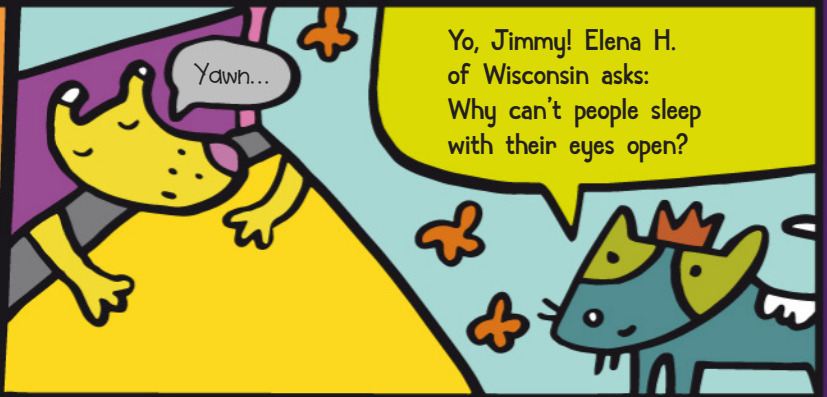
Tick





# ASK JIMMY & THE BUG

Words by Ellen Braaf, pictures by Dean Stanton



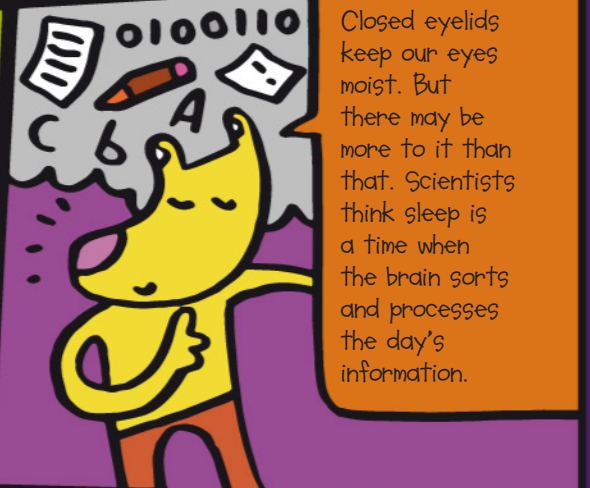
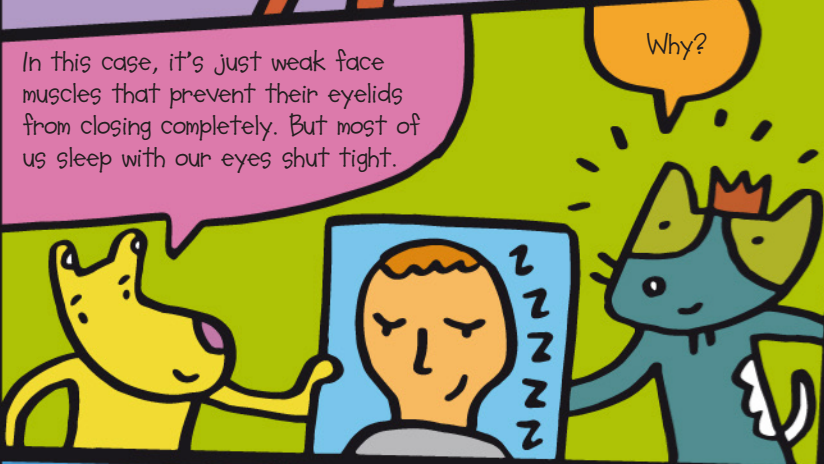
Some people do sleep with their eyes open—sleepwalkers. They can get up, climb stairs, even fix snacks, yet they're fast asleep. When they wake, they remember nothing.



No, usually only about 10 minutes. Scientists still aren't sure what causes this rare problem. Other people snooze with their eyelids slightly open.



In this case, it's just weak face muscles that prevent their eyelids from closing completely. But most of us sleep with our eyes shut tight.



So shutting your eyes might be a way of saying, "no new information now"?

Could be. Light also triggers "awake" chemicals in the brain—something you don't want when you're sleeping. Though dolphins, whales, and some birds can sleep with one eye open and half their brain awake!



Have a Question? BUG us anytime!

[ask@cricketmedia.com](mailto:ask@cricketmedia.com)

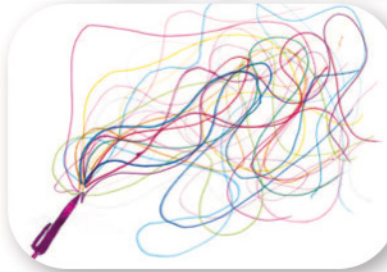


# CONTEST and LETTERS



Send your letters to Ask at [ask@cricketmedia.com](mailto:ask@cricketmedia.com).

In our April issue we asked you to send us dance-infused drawings. Thanks to all you waltzing, jiving, hip-hopping, pirouetting, and toe-tapping hoofers for sharing your dazzling dance moves.



Elijah D., age 11  
Utah



Joel M., age 12  
New York



Eleanor H., age 9  
Virginia



The Soul  
Genesis S., age 8  
Louisiana



Isabel B., age 9

Dear Avery,  
Do you ever get your acorns stolen by crows? And what is your favorite type of food? I know squirrels eat fungus, fruit, eggs, and nuts.

Everett, age 9, Illinois

P.S. Don't forget to prank Marvin back for what he has done to you.

Dear Everett,  
*I love acorns, and I'm always careful to protect mine from crows and other food snatchers (looking at you, Rats!). In fact, Marvin helps me by inventing contraptions to keep culprits from carrying off my stash, so I forgive him all his pranks.*

*Vigilantly yours,  
Avery*

Dear Ask,  
Could you please do an issue on electrical science? It would please me greatly if you did. This year I did a science fair project on electricity and learned quite a bit about how it works. A brief explanation of electricity is that electricity is electrons moving. There are two different ways to move electrons: a turning magnet inside a coil of copper wire





Lucy G., age 8  
California



Mini M., age 9  
Michigan



Lyla S., age 6  
Washington

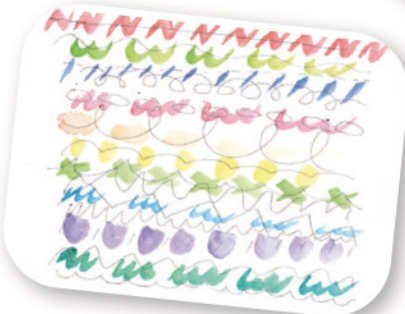


Roman W., age 13  
Washington



Prudence G., age 7  
New York

Emily J.,  
age 9  
California



**Dancing in the Wind**  
Reagan B., age 11  
Florida



generates electricity because the magnetic field pushes electrons around in the wire. This system is called a generator. The other way is a battery, and since I don't have all day to sit here explaining, you can just read a book about it. I am a collector of circuit boards, spare parts, and old batteries. I am interested in botany, zoology, parapsychology, bacteriological sciences, astronomy, astrophysics, astrology, history, art, and robotics.

I am ten years old, live in the biggest town on the Seward Peninsula, and my name is Caleb. I started getting *Ask* three years ago and have received nearly forty magazines over the years. My favorite animal is the tardigrade and I plan to do a science fair experiment called Tardigrades: they just won't die! I hope it wins. I can't think of anything more to write, so, uh, bye.

Caleb R., age 10, Alaska

*Dear Caleb,  
If your science fair experiment is anything like your letter, we're sure it will be a winner! Thanks for all the great ideas for future issues. We'll keep them in mind.*

*Best wishes,  
Everyone at Ask*



## October Contest

# *Bodacious* Bandage

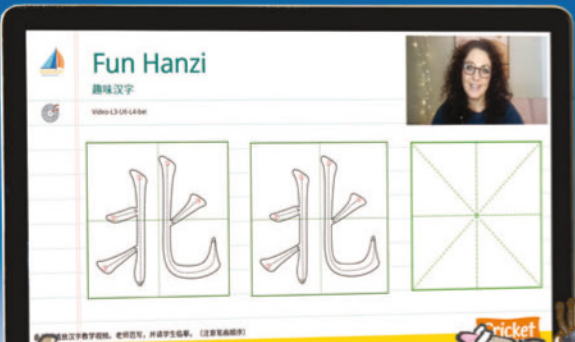
If you get a little cut or scrape, a stick-on bandage can help keep your blood on the inside, where it belongs. But just because bandages are useful doesn't mean they have to be boring! For this month's contest, design a fun bandage you wouldn't mind wearing around. Maybe some nice flowers? Or is your style more an extra eye or a picture of a bloody wound? Send us your beautiful or bold boo-boo strips, and we'll stick up a collection in an upcoming issue of *Ask*.



### Contest Rules:

1. Your contest entry must be your very own work. Ideas and words should not be copied.
2. Be sure to include your name, age, and address on your entry.
3. Only one entry per person, please.
4. Your entry must be signed or emailed by a parent or legal guardian, saying it's your own work and that no one helped you, and that *Ask* has permission to publish it in print or online.
5. For information on the Children's Online Privacy Protection Act, see the Privacy Policy page at [cricketmedia.com](http://cricketmedia.com).
6. Email a photo or scan of artwork to [ask@cricketmedia.com](mailto:ask@cricketmedia.com). Entries must be emailed by October 31, 2024.
7. We will publish the winning entries in an upcoming issue of *Ask*.

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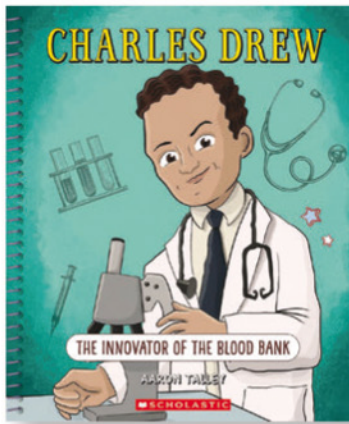
# Whatson's **BOOK** **CORNER**



art by  
Thor Wickstrom

## Charles Drew: The Innovator of the Blood Bank

by Aaron Talley



Charles Drew wanted to become a doctor to help people like his little sister, who died from a disease. He was Black and faced a lot of discrimination, but he never gave up. This book tells the

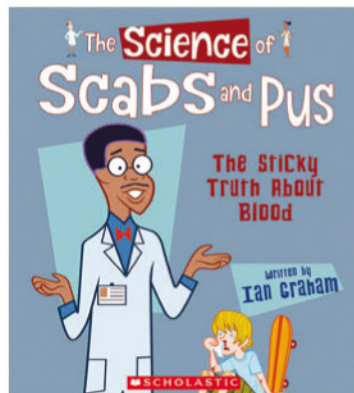
amazing story of how he learned all about blood and figured out how to store it longer and more safely. His work helped save millions!

## The Science of Scabs and Pus: The Sticky Truth about Blood

by Ian Graham

If you've ever wondered why scabs get crusty, this is the book for you! Each chapter asks interesting questions about blood and gives easy-to-understand answers. It's

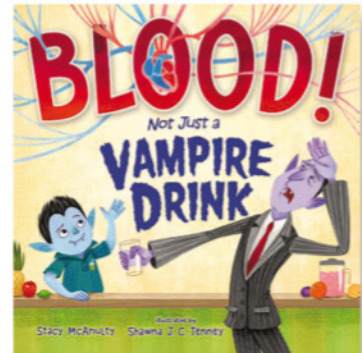
not all icky stuff like scabs, though—it also answers questions like "Why Do You Blush?" and "Do Animals Have Blood Groups?" I know so much more after reading this book!



## Blood! Not Just a Vampire Drink

by Stacy McNulty

A young vampire explains to the Count why vampires shouldn't drink blood—it's too important to humans. He suggests the Count try a chocolate milkshake instead! This picture book is a fun way to learn a lot about blood, like the fact that a person's body can make two million red blood cells per second. Can the Count be convinced to switch to smoothies? Read this book and find out!

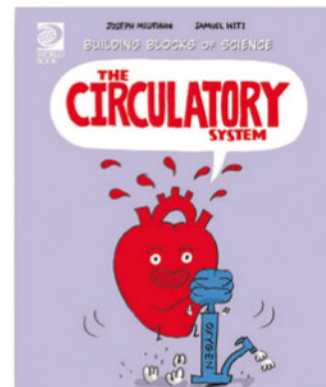


## The Circulatory System

by Joseph Midthun

Did you know that right this minute, millions of red blood cells are traveling through your entire body? It's true! The circulatory system carries blood from your head to your toes, but that's not all.

This book is drawn like a graphic novel, and its colorful pictures show you how it all works. I always understand things better when I can look at words and pictures together, don't you?





October 2024 Volume 23 Number 8 cricketmedia.com \$6.95

